EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the performance against the requirements. Currently using updated BAH requirements (Oct '02), including missions through 2006

All results are reported on the web site:
http://corn.eos.nasa.gov/performance/Net_Health/EMSnet_list.html.
It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs.

Highlights:

- ASF: Problem fixed as of 3 Jan. '03 -- problems had begun 23 October '02, often supported by just a single T1, other times getting high packet loss.
- ERSDAC: Problem fixed 3 Jan. '03 -- flow had become noisy and erratic on 12 November.
- EDC: user flows increased to 150 mbps average for the month! Total MRTG + iperf also increased (but somewhat less), raising rating for Dec '03 from low → Adequate.
- Other test results were stable

.Ratings Changes:

Upgrades: ↑
ASF: Low → **Good**
ERSDAC: Low → **Good**
EDC (Dec '03): Low → **Adequate**

Downgrades: ↓:
LaRC (Dec '03): Good → **Adequate**

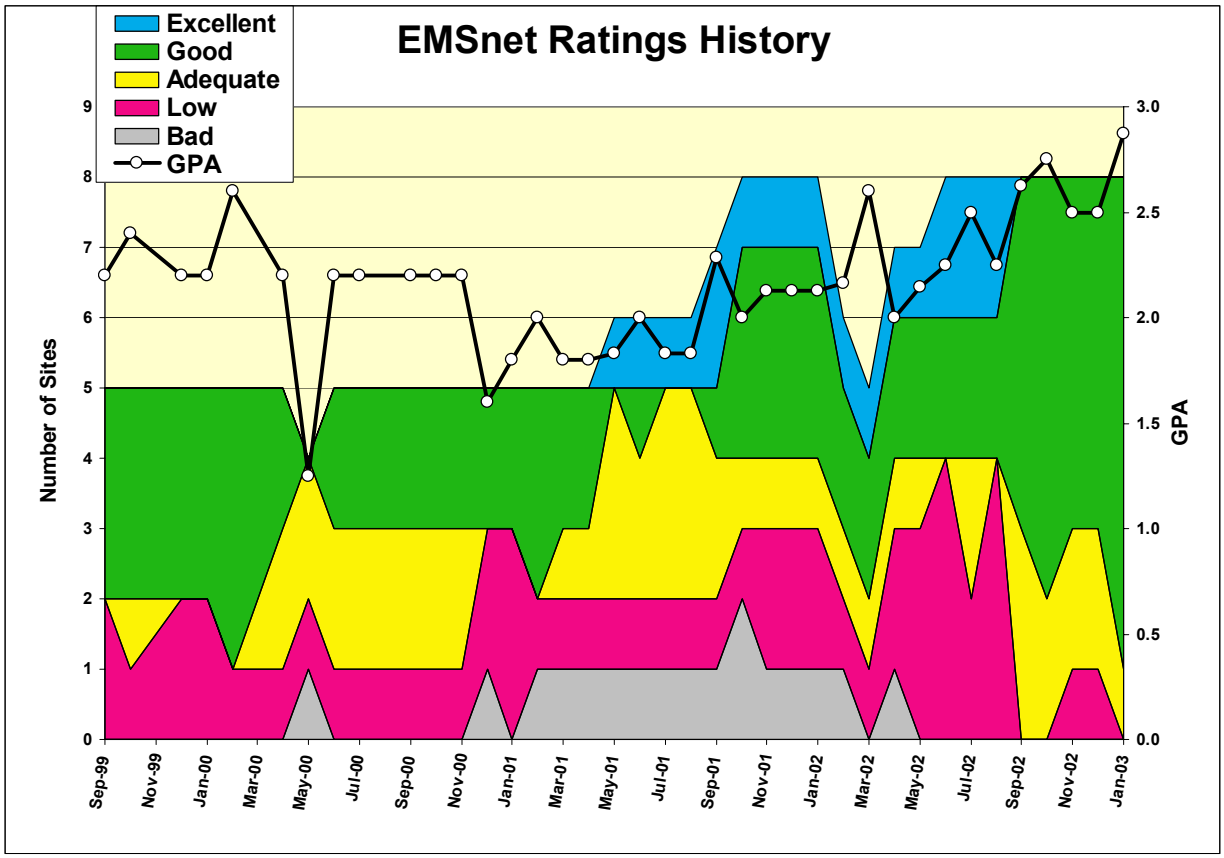
Ratings Summary:

Rating Categories:

Excellent: **Total Kbps** > Requirement * 3
Good: 1.3 * Requirement <= **Total Kbps** < Requirement * 3
Adequate: Requirement < **Total Kbps** < Requirement * 1.3
Low: **Total Kbps** < Requirement.
Bad: **Total Kbps** < Requirement / 3

Where Total Kbps = MRTG + iperf monthly average

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0



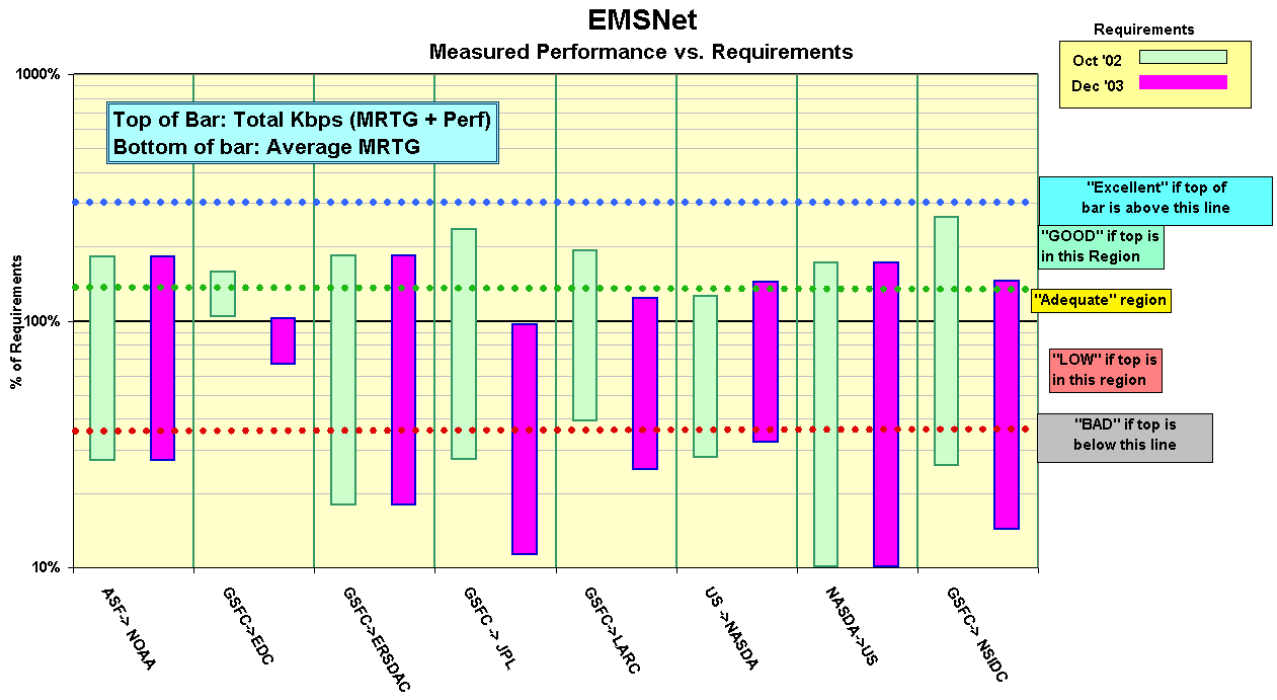
EMSnet Sites:
Network Requirements vs. Measured Performance

January 2003		Requirements (kbps)		Testing						
Source -> Destination	Team (s)	Current (Oct '02)	Future (Dec '03)	Source Node : Test Period	MRTG Avg kbps	Perf Avg kbps	Total Avg kbps	Current Status re Oct '02*	Prev Stat	Current Status re Dec '03*
ASF-> NOAA	ADEOS II	1613	1613	ASF->NESDIS: 29-Nov-02 - 31-Jan-03	436	2501	2937	GOOD	L	GOOD
GSFC->EDC	MODIS, LandSat	147233	227988	DOORS-EDCTest: 01-Dec-02 - 31-Jan-03	151500	81280	232780	GOOD	G	Adequate
GSFC->ERSDAC	ASTER	467	467	GDAAC: 03-Jan-03 - 31-Jan-03	83	775	858	GOOD	L	GOOD
GSFC -> JPL	QuikScat, TES, MLS, etc.	2825	6894	CSAFS: 15-Aug-02 - 31-Jan-03	770	5896	6666	GOOD	G	LOW
GSFC->LARC	CERES, MISR, MOPITT	38346	59979	GDAAC: 01-Jan-03 - 31-Jan-03	14900	59232	74132	GOOD	G	Adequate
US ->NASDA	QuikScat, TRMM, AMSR	1854	1620	CSAFS: 23-Aug-02 - 31-Jan-03	517	1814	2331	Adequate	A	GOOD
NASDA->US	AMSR	1374	1374	NASDA->JPL-SEAPAC: 02-Oct-02 - 31-Jan-03	74	2285	2359	GOOD	G	GOOD
GSFC-> NSIDC	MODIS	29249	53111	GDAAC: 05-Nov-02 - 31-Jan-03	7528	69405	76933	GOOD	G	GOOD

Notes:	All flow requirements listed are the greater of inflow or outflow					Ratings				
	Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II					Summary		vs Oct '02		vs Dec '03
								Score	Prev	Score
*Criteria:	Excellent	**Total Kbps** > Requirement * 3				Excellent		0	0	0
	GOOD	1.3 * Requirement <= **Total Kbps** < Requirement * 3				GOOD		7	5	5
	Adequate	Requirement < **Total Kbps** < Requirement * 1.3				Adequate		1	1	2
	LOW	**Total Kbps** < Requirement				LOW		0	2	1
	BAD	**Total Kbps** < Requirement / 3				BAD		0	0	0
	Change History:	27-Sep-99	Original - TRMM, Terra, and QuikScat				Total	8	8	8
		19-Jan-01	Incorporated BAH requirements including additional missions							
		9-Apr-01	Updated BAH requirements				GPA	2.88	2.38	2.50
		4-Jun-01	Added 50% contingency to BAH requirements							
		16-Nov-01	Added MRTG to Iperf, updated requirements, Revised criteria							
		2-Oct-02	Updated to revised BAH requirements							

Comparison of measured performance with Requirements:

This graph shows three bars for each destination. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (Oct '02, and Dec. '03). Thus as the requirements increase, the same measured performance will be lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below. But now there are NO sites rated "Excellent", "Low" or "Bad". US → NASDA is "Adequate", and the rest all are "Good"!

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

Details on individual sites:

1) ASF ←→ CONUS:

Rating: ↑ Low → **Good**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
ASF → NESDIS	2545	2501	689	436	2937
ASF → GSFC-CSAFS	2491	1675	740		
ASF→ JPL-SEAPAC	2800	2612	1327		
GSFC-CSAFS → ASF	2551	2150	1269		

Requirements:

Source → Dest	FY	mbps	Rating
ASF → NESDIS	'02, '03	1.61	**Good**

Comments: The 2.9 mbps total is very good for a 2 * T1 (3.1 mbps) circuit. Since this is more than 30% over the Oct '02 requirement, the rating is "Good".

A problem with the circuits between JPL and ASF began on 28 November, dropping the rating for December to “Low”. But the problem was fixed and normal operation resumed on 2 January ’03.

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2) GSFC → EDC:

Rating: Continued **Good**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
DOORS → EDC Test	170.9	81.3	57.7	151.1	232.4
DOORS → EDC DAAC	181.9	77.8	47.7		
G-DAAC→ EDC DAAC	112.2	45.4	27.5		

Requirements:

Date	mbps	Rating
Oct '02	147.2	**Good**
Dec '03	228.0	**Adequate**

The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall, and the last test goes through both the GSFC and EDC firewalls. From these values, it does not appear that the EDC firewall has much of an effect on thruput, but the GSFC firewall does

This month the user flows were again quite a bit higher than last month (by almost 50 mbps on average), but the corresponding thruput tests were 25 mbps lower, with the total therefore about 25 mbps higher. The combined MRTG + thruput remains 30% above the Oct '02 requirement, so the rating is still “Good”. The total is now also higher than the Dec ’03 requirement, raising that rating to “Adequate”.

3) JPL: Rating: Continued Good

Web Pages:

http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-CSAFS → JPL-SEAPAC	6.1	5.9	3.8	0.8	6.7
LaRC DAAC → JPL-TES	6.0	5.9	4.5		
GSFC DAAC → JPL-TES	20.8	16.3	8.1		
GSFC-MTVS1 → JPL-PODAAC	6.0	5.7	4.8		

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Oct '02	2.82	Good
GSFC → JPL combined	July '03	6.89	Low
LaRC DAAC → JPL-TES	July '03	4.58	Good

The GSFC-JPL requirement above was revised in August ’02 to include all flows on the GSFC-JPL circuit, including flows from LaRC and flows to NASDA and ASF. The rating is based on testing via EMSnet from CSAFS at GSFC to SEAPAC at JPL. Note that the MRTG value above also includes these flows.

Performance on this circuit has been very stable since the BOP switchover on 15 August ’02. With the combined requirement of 2.8 mbps, the performance continues to rate as “Good”. Adding in the 4.6 mbps of Aura requirements from LaRC, the performance is slightly below the combined 6.9 mbps requirement next July.

Performance from LDAAC to JPL-TES has also been very stable since it improved from 2.9 to 6.0 mbps on Aug 15, due to BOP.

The route from GDAAC to JPL-TES and JPL-PODAAC is still NISN SIP (since May 8 ‘02). The issue is that production and user flows cannot be separated by destination address, due to JPL’s network architecture. JPL assigns only a single address to each node. Other DAACs have distinct internal and external addresses, which allows the production data to be sent to them on EMSnet, and user data via NISN SIP. Since the combined production and user flow exceeds the EMSnet requirement (based on production flow only), EMSnet does not have the capacity to support both. Thus the production flows are currently routed over SIP, which has higher capacity.

There was a related problem in January where a JPL science user was trying to download data from MODIS (MTVS1) at GSFC. Since MODIS is on EMSnet, the JPL router sent packets to the JPL EMSnet router. However, science user traffic is not allowed on EMSnet, so the packets were dropped. The nodes were thus unable to communicate. After determining that MODIS has no EMSnet requirements to JPL, the solution was for JPL to route MODIS packets via NISN SIP. This fixed the problem.

However, from MODIS to JPL-PODAAC is still routed via EMSnet, so GSFC to JPL-PODAAC performance testing is still sourced from MTVS1. Performance has been very steady at 6 mbps since the BOP upgrade on 15 August ‘02.

4) GSFC → LaRC: Rating: Continued Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GDAAC → LDAAC	87.7	59.2	25.8	14.9	74.1

Requirements:

Date	mbps	Rating
Oct '02	38.3	Good
Dec '03	60.0	Adequate

Performance has been stable since the BOP switchover in August '02, still rated "Good" vs.the Oct '02 requirement. However, a drop in the iperf median (possibly due to GDAAC user traffic increases to EDC) reduces the rating to "Adequate" vs. the Dec '03 requirements.

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5) NSIDC: Rating: Continued Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html

GSFC → NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-DAAC → NSIDC	88.8	69.4	40.7	7.5	76.9

Requirements:

Date	mbps	Rating
Oct '02	29.2	Good
Dec '03	53.1	Good

Performance remains steady, although a bit lower, probably due to high flow rate from GSFC-DAAC to EDC. The ratings remain "Good". In November '02, testing was moved to a host at NSIDC with full-duplex connection, and performance improved.

Other Testing:

Source → Dest	Medians of daily tests (mbps)				
	Best	Median	Worst	Requirement	Rating
JPL → NSIDC-SIDADS	5.98	4.64	3.13	0.26	Excellent
LDAAC - NSIDC	4.81	4.66	4.45		

Performance has been very steady from JPL since the Aug '02 BOP switchover. Thruput from LDAAC jumped to about 6 mbps on 31 October, but dropped back to 5 mbps on 28 November. The requirement is still TBD.

6A) US → NASDA:

Rating: Continued **Adequate**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC-CSAFS → NASDA-EOC	2150	1814	544	517	2331
ASF → NASDA-EOC	2243	2004	592		

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → NASDA	Oct '02	1854	Adequate
GSFC → NASDA	Dec '03	1620	Good

Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA). Results from ASF to NASDA – were affected by ASF problems (above) –- fixed on 2 Jan. '03.

6B) NASDA → US:

Rating: Continued **Good**

Web Pages: http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html

Test Results:

Source → Dest	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
NASDA-EOC → JPL-SEAPAC	2328	2284	1245	74	2358
NASDA-EOC → GSFC-CSAFS	1395	1282	628		

Requirements:

Source → Dest	FY	kbps	Rating
NASDA → GSFC	'02, '03	1374	Good

Performance continues stable on the new circuit. The rating remains "Good".

Note: NASDA has not yet implemented testing with multiple tcp streams. So performance to GSFC is limited by the TCP window size on NASDA's test machine, in conjunction with the long RTT. Therefore, in order to reflect the actual capability of network, the rating is derived from testing from NASDA to JPL. This test uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be as severely limited by the TCP window size. The trans-Pacific circuit connects into the higher speed domestic EMSnet at JPL, which is not expected to be the limiting factor.

7) GSFC → ERSDAC: Rating: ↑ Low → Good

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html

Test Results:

Test Period	Medians of daily tests (kbps)				
	Best	Median	Worst	MRTG	TOTAL
GSFC → ERSDAC	795	775	378	83	844

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → ERSDAC	'02, '03	467	Good

Performance problem was fixed on 3 Jan ’03. Thruput using the 1 mbps ATM connection (since June ’02) had been very stable until November 12, when performance became noisy and erratic.